

AMENDMENTS TO THE CLAIMS:

The following listing of claims replaces all prior listings, and all prior versions, of claims in the application.

Listing Of Claims:

Claim 1 (Original)

A functioning substrate with a group of columnar micro pillars comprising:
a first matrix of organic polymer; and
the group of columnar micro pillars of organic polymer extending from said matrix;
wherein the equivalent diameter of each of said columnar micro pillars is 10 nm through 500 μ m with a height of 50 nm through 5000 μ m, and the aspect ratio of equivalent diameter (D) to the height (H) of each of said columnar micro pillars (H/D) is 4 or more.

Claim 2 (Original)

The functioning substrate according to Claim 1 characterized in that said group of columnar micro pillars is self-supporting.

Claim 3 (Original)

The functioning substrate according to Claim 1 characterized in that the aspect ratio of the equivalent diameter (D) to the height (H) of said columnar micro pillars (H/D) is 8 through 30.

Claim 4 (Original)

The functioning substrate containing a group of columnar micro pillars according to Claim 1 characterized in that the equivalent diameter of the tip end of said group of columnar micro pillars is smaller than that of the bottom surface.

Claim 5 (Original)

The functioning substrate containing a group of columnar micro pillars according to Claim 1 characterized in that the said group of columnar micro pillars has a portion tapering from the root in contact with said first matrix toward the tip end.

Claim 6 (Original)

The functioning substrate according to claim 1, wherein at least part of the micro pillars has at its tip portion an expanded portion in the diametric direction.

Claim 7 (Original)

The functioning substrate containing a group of columnar micro pillars according to Claim 1 characterized in that at least the surface of said group of columnar micro pillars is made of a substance mainly composed of a water-repellent and/or oil-repellent organic polymer.

Claim 8 (Original)

The functioning substrate containing a group of columnar micro pillars according to Claim 1 characterized in that at least a part of the surface of said group of columnar micro pillars is provided with metal plating.

Claim 9 (Original)

An optical device comprising:

a first matrix of organic polymer; and

a group of columnar micro pillars of organic polymer extending from said matrix;

wherein the tip end of said group of columnar micro pillars is in contact with the second matrix, the equivalent diameter of said group of columnar micro pillars is 10 nm through 10 μm with a height of 50 nm through 10 μm , and the aspect ratio of the micro pillars of said group of columnar micro pillars is 4 or more;

said optical device being further characterized in that said group of columnar micro pillars is arranged in such a way as to form at least one optical path, and one or more light incoming sections and one or more light outgoing sections are provided.

Claim 10 (Original)

The functioning substrate according to Claim 1 characterized in that part of said pillars is lacked to form clearances having a predetermined spacing.

Claim 11 (Original)

A micro biochip characterized in that a group of micro pillars made of a material including an organic polymer is formed on the matrix surface of an organic polymer, and the equivalent diameter of said micro pillar group is 10 nm through 100 μm with a height of 0.5 μm through 500 μm ; said micro biochip further characterized in that the aspect ratio of said micro pillar is 4 or more.

Claim 12 (Original)

The micro biochip according to Claim 11 characterized in that the organic polymer is modified on the surface of said micro pillar.

Claim 13 (Original)

The micro biochip according to Claim 11 characterized in that the organic polymer contains at least one of antigen, sugar chain and bases.

Claim 14 (Original)

The micro biochip according to Claim 11 characterized in that a plurality of micro pillar groups of organic polymer are provided in a flow path for feeding a sample and the tip end of said micro pillar is kept in contact with the upper substrate constituting the flow path.

Claim 15 (Original)

A method for manufacturing a functioning substrate equipped with a group of columnar micro pillars, which is arranged on the matrix composed of a material mainly of organic polymer so as to constitute a predetermined pattern, and which is provided with multiple bits having an equivalent diameter of 10 microns or less; said method comprising steps of:

applying pressure to a mold composed of a material harder than said material so as to press part of said material into said pit,
separating said mold from said material, and
stretching part of said material in said pit, thereby forming a group of columnar

micro pillars.

Claim 16 (Original)

A method for manufacturing a functioning substrate equipped with a group of columnar micro pillars according to Claim 13, characterized in that a spacer made of inorganic material is formed on the first substrate and a material membrane is formed on the surface including said spacer, said method comprises the steps of;
pressing said mold against said membrane,
separating said mold, and
bringing the second matrix in contact with the tip end of said group of columnar micro pillars through said spacer and fixing it thereon.

Claim 17 (Original)

A functioning substrate having a group of micro pillars made of organic polymer, wherein the micro pillars are self-supporting and arranged on a base member supporting the micro pillars, and wherein each of the micro pillars has an aspect ratio of 4 or larger, a diameter of $1 \mu m$ or less, and a height of $100 \mu m$ or less.

Claim 18 (Original)

The functioning substrate according to claim 16, wherein the equivalent diameter of one end of the micro pillars is smaller than that of the other end of the micro pillars, the ends of the micro pillars that have the smaller diameter being connected to the supporting member.

Claim 19 (Original)

The functioning substrate according to claim 16, wherein a plurality of layers of the micro pillars are supported on the supporting member, each of the layers being bonded to supporting members.

Claim 20 (New)

The functioning substrate according to Claim 1, wherein each of said columnar micro pillars has a length greater than a depth of respective pits of a mold used in forming said columnar micro pillars.

Claim 21 (New)

The functioning substrate according to Claim 1, wherein said group of columnar micro pillars are columnar micro pillars formed by pressing a mold having pits against said organic polymer, the organic polymer entering the pits so as to form pillars, and removing the mold, the pillars being stretched upon removal of the mold to form said columnar micro pillars.

Claim 22 (New)

The functioning substrate according to Claim 1, wherein said organic polymer is a material such that by pressing a molding having pits against said organic polymer, the organic polymer entering the pits so as to form pillars, and then removing the mold, the organic material is stretched upon removal of the mold so as to form the columnar micro pillars.

Claim 23 (New)

The functioning substrate according to Claim 1, wherein the columnar micro pillars have a first diameter at said matrix, and a second diameter at a position intermediate the height of the columnar micro pillars, and wherein the first diameter is greater than the second diameter.